

WHAT IS CLAIMED IS:

1. A plasma processing apparatus to provide plasma processing of a substrate by plasma, said plasma processing apparatus comprising a plasma processing gas supply means, an exhaust means in a plasma process chamber, and a plasma generating means; said plasma generating means further comprises ;

10 *SAC* a capacitatively coupled discharge means consisting of mutually isolated multiple conductors,

15 an electromagnetic wave radiating means to cause radio frequency displacement current to flow between said conductors and to emit electromagnetic wave, and

a magnetic field forming means;

wherein said electromagnetic wave radiating means further comprises an radiated electromagnetic wave power control means to control the radiated electromagnetic wave power through radio frequency displacement current control means forming a resonant circuit.

20 2. A plasma processing apparatus comprising a plasma processing gas supply means, an exhaust means in a plasma process chamber, a plasma generating means, and a means to process plasma using the generated plasma; said plasma generating means further comprises ;

25 a capacitatively coupled discharge means consisting of mutually isolated multiple conductors and

an electromagnetic wave radiating means to cause radio frequency displacement current to flow between said conductors and to emit electromagnetic wave;

5 wherein said electromagnetic wave radiating means further comprising an radiated electromagnetic wave power control means to control radiated electromagnetic wave power using the radio frequency displacement current control means forming a resonant circuit.

10 3. A plasma processing apparatus according to Claim 1 or 2 further characterized by comprising a means to store the processing procedure to control distribution during plasma processing and to control plasma distribution according to the processing procedure stored in said memory means.

15 4. A plasma processing method which supplies plasma processing gas into a plasma process chamber, sets the pressure inside said plasma process chamber to the preset value, and generates plasma by capacitatively coupled discharge, emission of electromagnetic wave by radio frequency displacement current and formation of magnetic field, thereby processing a substrate;

20 said plasma processing method comprises steps of; controlling radiated electromagnetic wave power by the radio frequency displacement current control means forming 25 a resonant circuit, and

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processing a substrate while plasma distribution is controlled during plasma processing.

5. A plasma processing method which supplies plasma processing gas into a plasma process chamber, sets the pressure inside said plasma process chamber to the preset value, and generates plasma by capacitatively coupled discharge, emission of electromagnetic wave by radio frequency displacement current and formation of magnetic field, thereby processing a substrate;

10 said plasma processing method comprises steps of;
 setting displacement current frequency within the range from 10 MHz to 200 MHz,
 controlling radiated electromagnetic wave power by the radio frequency displacement current control means
15 forming the resonant circuit
 controlling plasma distribution during plasma processing, and
 processing a substrate at the magnetic field strength within the range from 2×10^{-4} T to 10^{-2} T.

20 6. A plasma processing method according to Claim 4 or 5 further characterized in that plasma distribution is controlled to ensure that plasma processing of said substrate is completed uniformly for every plasma processing or during plasma processing according to uneven conditions of the substrate to be processed.

7. A plasma processing system comprising;
a plasma processing gas supply means,
an exhaust means in a plasma process chamber,
a plasma generating means,
5 a means to send RF current to a substrate to be processed,

and

a means to process plasma using the generated plasma;
said plasma processing system characterized in that
a RF bias circuit to send RF current to the substrate to
be processed is suspended with respect to the ground.

8. A plasma processing system comprising;

a plasma processing gas supply means,
an exhaust means in a plasma process chamber,
a plasma generating means, and
15 a means to send RF current to a substrate to be processed,

and

a means to process plasma using the generated plasma;
said means to send RF current to a substrate to be
processed further characterized in that;

20 multiple RF current conducting means are installed at
the position opposite to the position where the substrate
to be processed is mounted, and
said multiple RF current conducting means are provided
with a means to control a RF current ratio by each RF current
25 flowing from the substrate to be processed.